

## Amendments to the Specification

Please replace the title beginning at page 1, line 1, with the following rewritten title:

IMAGE PICKUP APPARATUS INCLUDING COMPENSATION RESPONSIVE TO PHASED DRIVE OF CHARGE TRANSFER GATES

Please replace the Abstract beginning at page 29, line 3, with the following rewritten Abstract:

~~The image pickup apparatus of the present invention includes the following: a solid state image pickup element that can be driven by splitting into a plurality of phases a charge transfer gate, which controls the transfer of a charge from a pixel part that forms part of a pixel array, to a perpendicular transmission path; a drive circuit that can supply a plurality of pulses for driving said charge transfer gate corresponding to the plurality of phases to the solid state image pickup element; an exposure control circuit that ends exposure by outputting the pulse for driving said charge transfer gate when a prescribed exposure time has elapsed since the start of exposure; a circuit for reading output signals that reads signals output by the solid state image pickup element; and a signal compensation circuit that adds, to an output signal read by said output signal reading means, a prescribed amount of signal compensation that is determined in correspondence with said exposure time and output signal level, when a plurality of pulses for driving said charge transfer gates corresponding to said plurality of phases~~

~~are output with prescribed time differences during exposure.~~ In a solid state image pick-up device,  
charge transfer gate pulse timing for different phases is  
intentionally offset resulting in different exposure  
times for different image element subsets of the image  
pick-up device. The amount of added signal compensation  
for an individual pixel is determined as a function of  
one or more of: exposure time, pixel output signal level,  
and strobe use.

This listing of claims will replace all prior versions, and listings, of claims in the application:

1 Claim 1 (currently amended): An image pickup apparatus,  
2 comprising:  
3           a solid-state image pickup element including  
4           a plurality of image parts forming a pixel  
5 array,  
6           a plurality of charge transfer gates,  
7 wherein each of said image parts is coupled with a charge  
8 transfer gate, and wherein each charge transfer gate can  
9 be controlled to transfer a charge from a coupled image  
10 part to a transmission path, and  
11           a charge transfer gate electrode split  
12 into a plurality of phases, wherein each of said  
13 plurality of charge transfer gates is associated with one  
14 of the plurality of phases thereby defining a plurality  
15 of sets of charge transfer gates, and wherein a drive  
16 signal via a charge transfer gate electrode of a given  
17 phase controls the corresponding set of associated charge  
18 transfer gates to transfer charges from a set of image  
19 parts to the transmission path;  
20 ~~that can be driven by splitting, into a plurality of~~  
21 ~~phases, a charge transfer gate, which controls the~~  
22 ~~transfer of a charge from an image part, which forms part~~  
23 ~~of a pixel array, to a vertical transmission path;~~  
24           driving means ~~capable of~~ for supplying a  
25 plurality of pulses, each of said pulses for driving a  
26 different set of charge transfer ~~gate~~ gates corresponding  
27 to one of said plurality of phases ~~to said solid-state~~  
28 ~~image pickup element;~~

29 exposure control means that ends exposure  
30 ~~through the output of said pulse for driving charge~~  
31 ~~transfer gate by control signalling when a prescribed~~  
32 ~~exposure time has elapsed since the start of exposure,~~  
33 resulting in the output by said driving means of said  
34 plurality of pulses driving said different sets of charge  
35 transfer gates, wherein, for a given image part, exposure  
36 ends with its corresponding charge transfer gate acting  
37 on a received corresponding driving pulse, said plurality  
38 of pulses driving said different sets of charge transfer  
39 gates resulting in different exposure times for at least  
40 some different sets of image parts for the same exposure  
41 setting;

42 means of reading output signals that reads  
43 signals output by said solid-state image pickup element;  
44 and

45 signal compensation means that conditionally  
46 implements adding adds, to an output signal signals read  
47 by said output signal reading means of reading output  
48 signals, a prescribed amount amounts of signal  
49 compensation, wherein each of said prescribed amounts of  
50 signal compensation that is determined in correspondence  
51 with said using the exposure time of the image part or  
52 parts from which the output signal is derived and output  
53 signal level, and

54 ~~when~~ wherein said a plurality of pulses ~~for driving~~  
55 ~~the charge transfer gates corresponding to said plurality~~  
56 ~~of phases~~ are output with prescribed time differences  
57 ~~during exposure.~~

1 Claim 2 (currently amended): The image pickup apparatus  
2 according to claim 1, wherein said signal compensation

3 means ~~implements said~~ adds said prescribed amount of  
4 signal addition compensation after implementing  
5 prescribed gamma conversion processing for said output  
6 signal read by said means for reading output signals.

1 Claim 3 (currently amended): An image pickup apparatus,  
2 comprising:

3 a solid-state image pickup element that can be  
4 driven by splitting, into a plurality of phases, a charge  
5 transfer gate, which controls the transfer of a charge  
6 from an image part, which forms part of a pixel array, to  
7 a vertical transmission path;

8 driving means capable of supplying a plurality  
9 of pulses for driving a charge transfer gate  
10 corresponding to said plurality of phases to said solid-  
11 state image pickup element;

12 exposure control means that ends exposure  
13 through the output of said pulse for driving charge  
14 transfer gate when a prescribed exposure time has elapsed  
15 since the start of exposure;

16 means of reading output signals that reads  
17 signals output by said solid-state image pickup element;  
18 and

19 signal compensation means that adds, to an  
20 output signal read by said means of reading output  
21 signals, a prescribed amount of signal compensation that  
22 is determined in correspondence with said exposure time  
23 and output signal level, when a plurality of pulses for  
24 driving the charge transfer gates corresponding to said  
25 plurality of phases are output with prescribed time  
26 differences during exposure, and

27                   wherein said signal compensation means  
28 implements said adding said prescribed amount of signal  
29 compensation after implementing prescribed gamma  
30 conversion processing for output signal read by said  
31 means for reading output signals, and  
32 ~~The image pickup apparatus according to claim 2,~~  
33                   wherein said signal compensation means does not  
34 implement said ~~addition~~ adding said prescribed amount of  
35 signal compensation when said exposure time is a  
36 prescribed value or more.

1 Claim 4 (currently amended): The image pickup apparatus  
2 according to claim 3, wherein said signal compensation  
3 means changes said prescribed amount of signal  
4 compensation ~~in said addition compensation~~ in  
5 correspondence with the state of use of strobe during the  
6 exposure.

1 Claim 5 (currently amended): An image pickup apparatus,  
2 comprising:  
3                   a solid-state image pickup element that can be  
4 driven by splitting, into a plurality of phases, a charge  
5 transfer gate, which controls the transfer of a charge  
6 from an image part, which forms part of a pixel array, to  
7 a vertical transmission path;  
8                   driving means capable of supplying a plurality  
9 of pulses for driving a charge transfer gate  
10 corresponding to said plurality of phases to said solid-  
11 state image pickup element;  
12                   exposure control means that ends exposure  
13 through the output of said pulse for driving charge

14 transfer gate when a prescribed exposure time has elapsed  
15 since the start of exposure;  
16 means of reading output signals that reads  
17 signals output by said solid-state image pickup element;  
18 and  
19 signal compensation means that adds, to an  
20 output signal read by said means of reading output  
21 signals, a prescribed amount of signal compensation that  
22 is determined in correspondence with said exposure time  
23 and output signal level, when a plurality of pulses for  
24 driving the charge transfer gates corresponding to said  
25 plurality of phases are output with prescribed time  
26 differences during exposure, and  
27 wherein said signal compensation means  
28 implements said adding said prescribed amount of signal  
29 compensation after implementing prescribed gamma  
30 conversion processing for output signal read by said  
31 means for reading output signals, and  
32 ~~The image pickup apparatus according to claim 2,~~  
33 wherein said signal compensation means changes  
34 said prescribed amount of signal compensation in said  
35 ~~addition compensation~~ in correspondence with the state of  
36 use of strobe during the exposure.

1 Claim 6 (currently amended): An image pickup apparatus,  
2 comprising:  
3 a solid-state image pickup element that can be  
4 driven by splitting, into a plurality of phases, a charge  
5 transfer gate, which controls the transfer of a charge  
6 from an image part, which forms part of a pixel array, to  
7 a vertical transmission path;

8                driving means capable of supplying a plurality  
9 of pulses for driving a charge transfer gate  
10 corresponding to said plurality of phases to said solid-  
11 state image pickup element;  
12                exposure control means that ends exposure  
13 through the output of said pulse for driving charge  
14 transfer gate when a prescribed exposure time has elapsed  
15 since the start of exposure;  
16                means of reading output signals that reads  
17 signals output by said solid-state image pickup element;  
18 and  
19                signal compensation means that adds, to an  
20 output signal read by said means of reading output  
21 signals, a prescribed amount of signal compensation that  
22 is determined in correspondence with said exposure time  
23 and output signal level, when a plurality of pulses for  
24 driving the charge transfer gates corresponding to said  
25 plurality of phases are output with prescribed time  
26 differences during exposure, and  
27 ~~The image pickup apparatus according to claim 1,~~  
28                wherein said signal compensation means does not  
29 implement said ~~addition~~ adding said prescribed amount of  
30 signal compensation when said exposure time is a  
31 prescribed value or more.

1 Claim 7 (currently amended): The image pickup apparatus  
2 according to claim 6, wherein said signal compensation  
3 means changes said prescribed amount of signal  
4 compensation ~~in said addition compensation~~ in  
5 correspondence with the state of use of strobe during the  
6 exposure.



1 Claim 8 (currently amended): An image pickup apparatus,  
2 comprising:  
3 a solid-state image pickup element that can be  
4 driven by splitting, into a plurality of phases, a charge  
5 transfer gate, which controls the transfer of a charge  
6 from an image part, which forms part of a pixel array, to  
7 a vertical transmission path;  
8 driving means capable of supplying a plurality  
9 of pulses for driving a charge transfer gate  
10 corresponding to said plurality of phases to said solid-  
11 state image pickup element;  
12 exposure control means that ends exposure  
13 through the output of said pulse for driving charge  
14 transfer gate when a prescribed exposure time has elapsed  
15 since the start of exposure;  
16 means of reading output signals that reads  
17 signals output by said solid-state image pickup element;  
18 and  
19 signal compensation means that adds, to an  
20 output signal read by said means of reading output  
21 signals, a prescribed amount of signal compensation that  
22 is determined in correspondence with said exposure time  
23 and output signal level, when a plurality of pulses for  
24 driving the charge transfer gates corresponding to said  
25 plurality of phases are output with prescribed time  
26 differences during exposure, and  
27 ~~The image pickup apparatus according to claim 1,~~  
28 wherein said signal compensation means changes  
29 said prescribed amount of signal compensation ~~in said~~  
30 ~~addition compensation~~ in correspondence with the state of  
31 use of strobe during the exposure.

1 Claim 9 (original): An image pickup apparatus,  
2 comprising:  
3           a two dimensional image pickup element that has  
4 a photoelectric conversion part arranged two-  
5 dimensionally and a vertical transmission path that is  
6 driven by a plurality of phase drive pulses, wherein of  
7 this plurality of phase drive pulses the drive pulse for  
8 one phase is further divided into a plurality of phases  
9 and acts as a pulse for transferring a signal charge from  
10 said photoelectric conversion part to said vertical  
11 transmission path;  
12           exposure parameters recognition means that  
13 determines exposure parameters for said image pickup  
14 element, including exposure time and flash use status,  
15 and recognises whether or not those parameters are  
16 prescribed exposure conditions; and  
17           disalignment compensation means that adds  
18 output signal that has been converted into digital signal  
19 by said image pickup element and prescribed compensation  
20 value when said exposure parameter recognition means  
21 recognises that said image pickup element is being driven  
22 under prescribed exposure conditions.

1 Claim 10 (original): The image pickup apparatus  
2 according to claim 9, wherein said prescribed  
3 compensation value is an addition value held in a table.

1 Claim 11 (original): The image pickup apparatus  
2 according to claim 9, wherein said exposure parameter  
3 recognition means recognises said prescribed exposure  
4 conditions based on the correlation between the timing  
5 with which flash lighting stops and the timing with which

6 said drive pulse for one phase is generated.

1 Claim 12 (new): The image pick-up apparatus according to  
2 claim 1, wherein each of said prescribed amounts of  
3 signal compensation is determined further using output  
4 signal level.

1 Claim 13 (new): The image pickup apparatus according to  
2 claim 12, wherein said output signal level is determined  
3 on a per pixel basis, and wherein different pixels within  
4 a pixel array, which correspond to a portion of a  
5 composite image picked-up by said image pick-up element  
6 and which also correspond to the same drive transfer gate  
7 drive pulse, can have different values of prescribed  
8 compensation which is added to said output signal, said  
9 different values of prescribed compensation being  
10 determined as a function of said output signal level  
11 corresponding to the pixel.

1 Claim 14 (new): The image pickup apparatus according to  
2 claim 1, wherein when said exposure setting is greater  
3 than an upper limit, said signal compensation means does  
4 not perform said adding to output signals prescribed  
5 amounts of signal compensation to any of said output  
6 signals.

1 Claim 15 (new): The image pickup apparatus according to  
2 claim 1, wherein when said signal compensation means does  
3 perform said adding prescribed amounts of signal  
4 compensation to output signals, said signal compensation  
5 means adds prescribed amounts of signal compensation to  
6 some output signals but does not add prescribed amounts

7 of signal compensation to any output signals  
8 corresponding to one of said plurality of pulses.

1 Claim 16 (new): The image pickup apparatus of claim 15,  
2 wherein said one of said plurality of pulses is a pulse  
3 resulting in the longest exposure time.

1 Claim 17 (new): The image pick-up apparatus according to  
2 claim 1, wherein said plurality of pulses are structured  
3 such that at least some of the pulses have concurrent  
4 timing and wherein a first set of a plurality of pulses  
5 with first concurrent timing are aligned with a second  
6 set of a plurality of pulses with second concurrent  
7 timing such that the falling edges of the first set of  
8 pulses correspond to the rising edges of the second set  
9 of pulses, said first and second sets being disjoint sets  
10 within said plurality of pulses.

1 Claim 18 (new): The image pick-up apparatus according to  
2 claim 17, wherein each one of said plurality of pulses  
3 has at least one edge which aligns with an edge of at  
4 least one other pulse within said plurality of pulses.

1 Claim 19 (new): The image pick-up apparatus according to  
2 claim 1, wherein said adding prescribed amounts of signal  
3 compensation includes adding negative amounts of signal  
4 compensation to at least some output signals.